

## DESCRIPTION OF NEW FOSSIL LIVERWORT FROM THE FORT UNION BEDS OF MONTANA.

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The Liverworts or Hepaticæ in a fossil state are of such extremely rare occurrence that each additional authentic instance becomes a matter of exceptional interest, and it is therefore with great pleasure I am able to record the presence, in the Fort Union (Eocene) beds, of what seems an indisputable member of this group for which I propose the name:

**MARCHANTIA PEALEI**, new species.

Thallus of large size, at least 8 cm. long and 1.25 cm. wide, distinctly forking and with the margins erose or erose-undulate; "mid-rib" broad and diffused with the bundles of closely appressed rhizoids radiating obliquely from it in such a manner as to simulate veins; fruit not preserved.

*Type-locality*.—Hedges coal mine, north side of Yellowstone River, opposite Miles City, Custer County, Montana.

*Horizon*.—Lower portion of Fort Union (Eocene).

*Type-specimen*.—Cat. No. 33928, U.S.N.M.

The splendid specimen, so well shown in the figure, was collected by Dr. A. C. Peale and Mr. A. J. Collier in August, 1907, from material excavated at a point about 8 feet above the principal coal vein of the vicinity and was the only specimen of the species secured. It is preserved in a soft, fine-grained grayish white clay, and as much of the carbonaceous matter is still present, it exhibits the characters very distinctly. It has been very little distorted and still has much the appearance of one of the living species growing over the surface of the ground; in fact, it is rather difficult in the absence of fruit to find characters by which to definitely separate it from the living *Marchantia polymorpha* Linnaeus, of such wide geographical distribution. As may be seen from the figure, it is very distinctly forked, one

of the largest thalli showing three such branches. The carbonaceous matter has come off over the "midrib," showing it to be broad and diffuse, this being a well-known character of the living *Marchantia*. The obliquely disposed bundles of rhizoids, which, as already stated, somewhat simulate veins, are exactly paralleled in many well preserved specimens of *M. polymorpha* in the herbarium of the U. S. National Museum. One thing which may militate against its reference to *Marchantia* is the absence of the fine areolations which are so conspicuous in the thallus of the living species. Otherwise it is so close to the living *M. polymorpha* as to preclude the propriety of referring it to other than the living genus. It is entirely possible that subsequent exploration in the beds whence it came may disclose the presence of fruit, but until such is discovered its relation may remain as above set forth.

So far as I know only two species of Hepaticæ have previously been reported in a fossil state in this country, though specimens of the living *Marchantia polymorpha* have been found in calcareous tuff, evidently of recent age. The oldest of these is a doubtful specimen from the Jurassic beds of Douglas County, Oregon, referred by Fontaine<sup>a</sup> to *Marchantites erectus* (Bean) Seward, but it is very unlike the present species, and it is doubtful if it is properly referred to the Hepaticæ.

The other form is *Preissites wardii* Knowlton,<sup>b</sup> found in beds of the same age as the form under discussion, and coming from Burns's Ranch on the lower Yellowstone, 30 miles below Glendive, Montana. *Preissites wardii* is a much smaller species than *M. pealei*, the extremes of size as observed being a length of from 8 to 15 mm. and a width of about 6 mm. It strongly suggested the living *Marchantia polymorpha*, but on account of the presence of prominent vein-like lines nearly at right angles to the midrib it was thought to be probably most closely related to the living genus *Preissia*. In this genus the under side of the thallus is provided with scales which it was thought might appear as lines if fossilized. The vein-like lines are present in *M. pealei*, but they are clearly due, as already explained, to bundles of rhizoids and not to ventral scales. It is possible, however, that with further material of both forms the supposed generic lines might break down, but specifically they would differ in the smaller size and different mode of branching in *P. wardii*.

A form that is very much closer to *M. pealei* is *Marchantia sezanensis* Brongniart, which was found by Saporta<sup>c</sup> so well preserved

<sup>a</sup> Fontaine in Ward, U. S. Geol. Surv., Mon. 48, 1905, p. 52, pl. VII, figs. 1, 2.

<sup>b</sup> Bull. Torr. Bot. Club, XXI, 1894, p. 458, pl. CCXIX.

<sup>c</sup> Mém. Soc. Géol. d. France, 2 ser., VII, 1868, p. 308, pl. XXII, figs. 1-8.

and in fruit in the travertines (Eocene) of Sezanne. This species, which Saporta also compares with *M. polymorpha*, is similar to *M. pealei*, though it is considerably smaller, and differs slightly in the character of the margin, while the areolation of the thallus appears to have been very well preserved. As this feature was not preserved in the Miles City specimen, it would be necessary to keep them distinct for the present if for no other reason. It is not necessary to speak of the fruit of *M. sezannensis*, since the fruit has not been found in *M. pealei*.

In concluding it may be pointed out that it seems a rather singular fact that the two authentic examples of fossil Hepaticæ thus far found in this country should both have come from the same part of the Fort Union beds of Montana.